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Business Results of Eco-Innovation in Emerging and Developed Economies

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Abstract

The article explored 323 sustainability reports certified by the *Global Reporting Initiative*, with the primary aim of assessing – at the company level – the structure of results of eco-innovation at firms established in developed markets and emerging markets in the period from 2012 to 2014. A valid sample of 231 companies was obtained, including 58 from emerging countries and 173 from developed countries. The methodology was based on Structural Equation Modeling and Panel Data Regression. The study found that virtually all environmental and social eco-innovation variables were significant for their respective dimensions in developed countries; however, in the emerging countries, only two environmental and social variables were significant, which shows that there is a more advanced stage of eco-innovation in developed countries. With regard to the results of the panel data regression, the environmental and social variables were significant only for the Return on Sales (ROS), and in a different way between emerging and developed countries.

Keywords: *sustainable innovation, capacity to innovate, performance, emerging economies*

1. Introduction

There is a consensus among academics and professionals regarding the need for significant changes in how business practices interact with natural and social environments that surround companies or are impacted by their products (Vivanco et al., 2015; López and Montalvo, 2015; Segarra-Oña et al., 2015; Lee and Min, 2015; Franceschini and Pansera, 2015).

The main theoretical aspect for investments in eco-innovation is based on pressure from stakeholders and regulatory agencies, and not as a strategy originating from the mission of companies, such as business practice (Yang and Yang, 2015; Borghesi et al., 2015; Roscoe et al., 2016; Rennings and Rammer, 2010).

There is a certain difficulty in identifying the influence of investments in eco-innovation on business performance, the empirical results of which are controversial. This is mainly due to the absence of constructs and variables that define environmental and social results, as well as the very availability and reliability of information at the company level (Yang and Yang, 2015; Przychodzen and

Przychodzen, 2015; Lee and Min, 2015; Río et al., 2016; Cai and Zhou, 2014).

Hence, there is an initial theoretical effort in Brazil to construct a model for analyzing eco-innovation, as well as in the systematic collection of data (Santos et al., 2015; Basso et al., 2013; Maçaneiro et al., 2013; Khul et al., 2016). The results are still incipient, and when they are associated with international research, one can see a divergence of conclusions regarding the importance of eco-innovation for business performance; it is evident that there are more investments and satisfactory results in developed countries than in developing countries (Santos et al., 2017).

Furthermore, the differences in results among studies in emerging and developed countries initially suggest that there are differences in results and even in the availability of information between sectors and even between companies of the same sector established in different countries (Przychodzen and Przychodzen, 2015; Santos et al., 2017; Jo et al., 2015; Maçaneiro et al., 2013). However, there are no studies that have investigated the relationship between performance and eco-innovation between developed and emerging countries at the company level, but rather only at the country aggregate indicators level (Jo et al., 2015; Davidescu et al., 2015; Santana et al., 2015).

In this context, with theoretical controversies and dissident results in empirical studies, this article is proposed. The problem that motivated this study is as follows: Are there differences in the structure of eco-innovation results at companies based in countries at different stages of development? To find the solution to this question, the main objective of this study is postulated as follows: Evaluate, at the company level, the structure of results of eco-innovation at firms established in developed markets and emerging markets in the period from 2012 to 2014.

Studying emerging markets is strategic because of their importance in global production chains and their economic and corporate representativeness, besides being countries that need to develop an economic structure that allows economic growth as well as a 'balanced' use of natural resources and enhancement of people's quality of life (Przychodzen and Przychodzen, 2015; Jabbour et al., 2015; Fernando et al., 2016; Davidescu et al., 2015; Köhler et al., 2014).

Nonetheless, countries at a more advanced stage of development exhibit major institutional differences, compared to developing countries, which may suggest different strategies among companies (Kijek, 2015; Lee and Min, 2015; Hojnik and Ruzzier, 2016a; Jo et al., 2015). An analysis based on company data allows us to analyze possible non-standard sectorial or regional behavior, and then it is possible to contribute to the theoretical discussion about the motivation for investments in eco-innovation (Mondéjar-Jiménez et al., 2015; Cai and Zhou, 2014; Galliano and Nadel, 2015).

The next topics to be addressed below are the Methods, with a characterization of the study conducted, the sample, the variables selected, the programs and the variables that were analyzed, followed by the Results, Conclusion, and References.

2. Methods

2.1 Material

This article has an exploratory nature and a quantitative approach. The sample consists of companies with reports certified by the Global Reporting Initiative (GRI), in versions 4.0, and initially contained 323 companies. However, after obtaining the data of each company through sustainability reports, that number was reduced to 288, with 79 from emerging countries and 209 from developed ones, as a function of actual existence/availability of the reports. Finally, by associating the companies that disclosed eco-innovation information with those that disclosed the financial variables, a sample of 231 companies was ultimately obtained, of which 58 are from emerging countries and 173 are from developed countries, i.e., 71.52 % of the sample initially proposed. It is noteworthy that the results in the GRI are not presented in a standardized way, so all reports were individually analyzed, totaling more than 50,000 pages.

The financial information of the companies was taken from the Economática® System and from the Capital IQ database. Three databases were constructed, namely: 1. Data from all companies; 2. Data

from companies in developed countries; 3. Data from companies in emerging countries. This procedure allows for an analysis of the results of the total set of companies and the segregated databases, as a way of verifying possible differences in regulatory stages and the demand of local markets (Rennings and Rammer, 2010).

Table 1 shows the variables that were collected in the reports of each company (GRI or Standardized Financial Statements).

Table 1 – Variables of the Model

Dimension	Nomenclature	Description	Measure unit	GRI / DF
Financial	Revenue Evolution (RE)	Change in Net Revenue – NR [(NRt – NRt-1)/NRt-1	%	DF
	ROI	Net operating income for the period divided by the Investment	%	DF
	ROS	Net income for the period divided by total revenue.	%	DF
Environmental	Eco-Patents (P)	Number of patents recognized or applied for by the organization in the period	Number	GRI
	GHG emissions (GHG)	Relationship between current emissions and previous year's emissions in tonnes CO_2 equivalent. $(GEE_t - GEE_{t-1})/GEE_{t-1}$	%	EN15
	Wastewater Emissions (WWE)	Relation between the current capacity to reuse the wastewater with the capacity to reuse wastewater in the previous year, in cubic meters $(WWE_t - WWE_{t-1})/WWE_{t-1}$	%	EN22
	Solid waste (SW)	Total waste reused, recycled, incinerated or used for cogeneration, divided by total waste generated.	%	EN23
	Materials Consumption (MC)	Quantity of materials used, divided by revenue	%	EN1
	Energy Consumption (EC)	The ratio of current energy consumption to energy consumption in the previous year (ECt-CCt-1) / CCt-1 (Gigajoules -GJ; Tetajoules-TJ; boe, GWH, etc.)	%	EN3
	Water Consumption (WC)	The ratio of current water consumption to water consumption in the previous year $(WC_t - WC_{t-1})/WC_{t-1}$	%	EN8
Social	Workplace Accidents (WA)	Comparison of the Workplace Accident Frequency Rate in the present year to that of the previous year. The rate is measured with the total number of employees involved in a work-related accident multiplied by 1 million and divided by the amount of the organization's man-hours.	%	LA6
	Absenteeism (AS)	Ratio of the Percentage of Lost Time due to illness or accident in the current year compared to that of the previous year. The PLT is the ratio of the number of hours of employees on accident leave by the number of hours worked.	%	LA6
	Turnover (TR)	Employee turnover rate, which measures the ratio between the number of employees hired by the number of employees terminated. The rate is measured by the sum of the employees who left the company and the total number of employees.	%	LA1
	Social Emancipation (SE)	Participation of the company's investments in the external community, aimed at improving education, health, sports, leisure and culture. The rate is measured by dividing these expenditures by the revenue in the period	%	SO1
	Equal pay for men and women (EP)	Ratio of the salary/wages of male employees to female employees	%	LA13

Source: elaborated by the authors

In this way, in order to construct the database, downloaded each company's sustainability report published in the years 2013, 2014 and 2015, in reference to the periods of 2012, 2013 and 2014, respectively. Next, each variable was searched for by its code in the report and then the calculation is made according to the description of the variable in Table 1. However, as mentioned above, unlike financial information, the requirements indicated by the GRI are not standardized, and although there is a requirement for the presentation of objective and quantitative information, few companies actually do so; this finding is only possible after reading the reports.

2.2 Methods

Structural Equation Modeling (SEM) and Panel Data Regression Analysis were used as complementary methodological strategies to analyze the influence of investments in eco-innovation on business results. The SEM allows one to assess whether the theoretical dimensions of eco-innovation (environmental, social and economic) are significant constructs (latent variables), based on the

explanatory variables of Table 1 (Little, 2013). The technique used for SEM was based on covariance, according to the understanding that the latent variables are formative, and the economic construct would also be formed by the environmental and social dimensions (second-order construct) (Hair Jr. et al., 2014).

By reason of the size of the sample, and because it is a theoretical exploratory model with real data extracted from sustainability reports, the two main indicators for measuring the SEM adjustment were used, namely: Goodness of Fit Index (GFI) and Root Mean Square Approach Error (RMSEA). The following is considered as acceptable: GFI > 0.9 and RMSEA < 0.08 (Hair Jr. et al., 2014).

Due to the limitation of the sample, it was not possible to undertake the longitudinal SEM, which requires a larger sample because of the amount of covariance to be estimated (Little, 2013). The possibility of analyzing the effects of investments in eco-innovation on business performance, also considering time, is relevant because of the learning curve involved. Therefore, Panel Data Regression was used in order to complement the use of SEM and to assess the partial coefficients of the explanatory variables of eco-innovation on business results, also as a function of time (two years). Due to the impossibility of creating constructs in the panel data regression analysis, as well as the limitation of the sample, which restricts the model's degrees of freedom with the inclusion of all the predicted independent variables in the environmental and social dimensions (Table 1), two regressions were undertaken, considering the environmental and social explanatory variables distinctly. The generic empirical model for regression analysis is expressed in equation 1.

$$y_{it} = \alpha_i + \beta_1 x_{lit} + \ldots + \beta_k X_{kit} + e_{it} \quad (1)$$

Where,

i = different individuals; t = time period analyzed; α_i = intercept to be estimated for each individual; β_k = angular coefficient of the model's k-th explanatory variable;

Due to the impossibility to use constructs, also, for the dependent variable, the Y variable of the empirical model (equation 1) was used individually using the business results of each of the indicators (ROS, ROA and ROE). The panel analysis technique with weighted effects was used to correct the heteroscedasticity evidenced in the fixed effects model, as well as to eliminate the need for dummies for each of the companies (231), which generates a significant loss of degrees of freedom. To assess the model's goodness of fit, the coefficient of determination and the F statistic of the model were used (Gujarati and Porter, 2011).

3. Results

Tables 2 and 3 indicate the mean, standard deviation and number of companies located in developed and emerging countries that disclosed each of the environmental, social and financial variables analyzed in this study, and these values are calculated through the variations from 2012 to 2014.

Table 2 – Environmental and Social Variations of Emerging and Developed Countries from 2012 to 2014.

Developed countries												
2013	GHG	WWE	SW	MC	EC	WC	P	WA	AS	TR	SE	EP
Mean	-0.56%	-0.36%	4.77%	2.15%	-0.17%	1.99%	-9.34%	-1.98%	-5.84%	-0.25%	19.45%	-3.21%
St.Dev.	0.25	0.32	0.42	0.31	0.20	0.36	0.41	0.47	0.30	0.28	0.69	0.17
Companies*	160	73	117	55	143	132	21	143	95	82	57	36
2014	GHG	WWE	SW	MC	EC	WC	EP	WA	AS	TR	SE	EP
Mean	-3.84%	0.20%	4.67%	4.00%	-4.79%	2.73%	5.22%	-7.64%	4.48%	14.69%	2.34%	0.06%
St.Dev.	0.24	0.36	0.46	0.42	0.24	0.42	0.27	0.34	0.53	0.59	0.45	0.20
Companies	161	73	116	55	143	132	21	143	95	82	58	36
Emerging Countries												
2013	GHG	WWE	SW	MC	EC	WC	EP	WA	AS	TR	SE	EP
Mean	3.13%	0.57%	11.03%	-2.59%	-0.92%	2.06%	52.21%	-1.08%	-5.17%	7.54%	2.82%	-9.53%
St.Dev.	0.25	0.18	0.57	0.16	0.14	0.35	0.95	0.38	0.58	0.44	0.22	0.40
Companies	46	27	40	14	44	49	7	39	23	37	23	20
2014	GHG	WWE	SW	MC	EC	WA	EP	WA	AS	TR	SE	EP

Mean	5.86%	-1.32%	27.81%	18.46%	-0.15%	-4.34%	16.11%	-2.48%	-22.12%	2.72%	7.74%	6.13%
St.Dev.	0.34	0.47	1.07	0.28	0.23	0.22	0.52	0.67	0.39	0.41	0.74	0.53
Companies	46	27	40	14	44	49	7	39	23	37	23	20

Notes:* number of companies that reported each variable within the sample
Source: Prepared by the author based on the research data

Based on Table 2, one can see that the environmental variables most widely disclosed by the two economies were GHG emissions, energy consumption (EC) and water consumption (WC). This large percentage of organizations disclosing information on these three variables can be explained by companies that focus on reducing energy, CO^2 emissions, consumption of materials, and increasing recycled materials, in fulfillment of government regulations and as a way to be prepared for new regulations in the future (Horbach et al., 2012).

Costantini et al. (2017) and Horbach et al. (2012) observed a direct and very significant effect of eco-innovation on reduced intensity of pollutant emissions in general in developed countries, which shows the importance of the GHG variable for eco-innovation. This is also the case regarding the importance of proper management of energy resources, in which Scarpellini et al. (2017) identified this variable as relevant to the process and development of eco-innovation. This search for lower consumption of energy and materials is seen mainly as a way to reduce costs, as observed in the study of Horbach et al. (2012).

As for the environmental results of emerging countries, one can see – as in the study conducted by Santos et al. (2017) with Brazilian companies – a reduction in water consumption, an increase in the amount of reused or recycled waste, and an increase in energy consumption. However, unlike the findings indicated in the study, there was a decrease in GHG emissions, which is something positive.

When analyzing the social results, the most widely reported variable for not only emerging but also developed countries was the workplace accident frequency rate. However, it can be said that the emerging countries are more concerned with social issues than the developed countries, since there was an improvement in all social variables, such as the reduction of workplace accidents, lost-time injuries and employee turnover.

Table 3 shows the financial results of the two economies; the variables chosen for analysis are Return on Sales (ROS), Return on Assets (ROA) and Revenue (RE).

Table 3 – Financial Results of Emerging and Developed Countries from 2012 to 2014

Statistics	ROS_12	ROS_13	ROS_14	ROA_12	ROA_13	ROA_14	RE_13	RE_14
Average – Developed Countries	4.16%	4.25%	7.51%	6.57%	6.37%	6.70%	3.15%	-2.91%
Standard deviation	0.19	0.22	0.19	0.09	0.07	0.09	0.10	0.12
Average – Emerging Countries	9.72%	5.40%	5.39%	7.63%	8.76%	7.95%	0.39%	1.34%
Standard deviation	0.17	0.24	0.15	0.13	0.08	0.09	0.21	0.24

Source: Prepared by the author based on the research data

Regarding the financial results of companies established in developed countries, ROS and ROA increased in all the years observed; however, there was a reduction in Revenue. This was also pointed out by Przychodzen and Przychodzen (2015), Lee and Min (2015), and Hojnik and Ruzzier (2016b), who evaluated firms established in developed countries; they observed that eco-innovation activities are significantly and positively related to ROA, ROS and ROE. Cegarra-Navarro et al. (2016) identified a positive relationship between innovation and economic responsibility. Scarpellini et al. (2017) and Horbach et al. (2012) observed that eco-innovative companies have higher average rates of leverage.

In relation to the emerging countries, there is a decrease in ROS, but an increase in ROA and Revenue, and virtually all values of ROS, ROA and Revenue are higher in emerging countries than in developed countries during the period analyzed.

Table 4 shows the results of the environmental, social and financial dimensions of the Structural Equations Model of companies in developed countries, in emerging countries, and overall, from 2013 to 2014. The eco-patents variable was excluded from this analysis, due to the small amount of data generated for the sample. Therefore, a total of 14 variables were used: six environmental, five social,

and three financial variables.

Table 4 – Standardized coefficients of the structural equations model of emerging and developed countries.

Variables		*Latent variable*	*Coefficients Developed Countries 2013*	*Coefficients Developed Countries 2014*	*Coefficients Emerging Countries 2013*	*Coefficients Emerging Countries 2014*	*Coefficients Full Sample 2013*	*Coefficients Full Sample 2014*
Financial	<-	Social	.096 [b]	.017	.999 [a]	-.125	.026	.347 [a]
Financial	<-	Environ	.009	.027[b]	-.003	.162[c]	.065	.422 [a]
GHG	<-	Environ	.035	.044	.044	.023	.042	.037
WWE	<-	Environ	.008 [b]	.008[a]	-.005	.000	.006	.002
SW	<-	Environ	.022 [a]	.013 [a]	.011 [a]	-.001	.005 [b]	.001
MC	<-	Environ	.075 [b]	.023	3.791	-.208	.088	.257 [a]
EC	<-	Environ	.014	.052 [b]	.078	.351 [c]	.030	.290 [a]
WC	<-	Environ	4.762 [a]	4.205 [a]	.036	.129	2.174	-.099 [b]
WA	<-	Social	.035	.044	.627	.023	.035	.037
AS	<-	Social	.008 [b]	.008 [a]	-.163	.000	.005	.002
TR	<-	Social	.022 [a]	.013 [a]	-.303 [b]	-.001	.009 [b]	.001
SE	<-	Social	.075 [b]	.023	-.125	-.208	.035	.257 [a]
EP	<-	Social	.014	.052 [b]	.068	.351 [c]	.036	.290 [a]
RE	<-	Financial	.999	1.000	.999	1.000	.999	.041
ROA	<-	Financial	.149 [b]	.299 [a]	.643 [a]	-.080	.082	.037
ROS	<-	Financial	.488 [a]	.420 [a]	-.056	-.168	.141 [b]	.999
RMSEA Adjustment Test			.097	.099	.127	.096	.079	.075
GFI Adjustment Test			.835	.811	.735	.780	.876	.875

Notes: [a] = Significance >99%; [b] = Significance > 95%; [c] = Significance > 90%. Environ. - Environmental
Source: Prepared by the author based on the research data

As this is a theoretical model, evaluated with empirical data taken from the reality of the companies researched rather than from fixed scales, the quality of the adjustment of the SEMs is low (RMSEA and GFI), being acceptable only in the total samples of 2013 and 2014. Nonetheless, only in the 2013 model for emerging countries was the result much higher than the limit established for the RMSEA. In spite of the limitations regarding the adjustments and restrictions in the use of coefficients for estimation, it is understood that the results of the significant coefficients are relevant for analysis, due to the exploratory characteristic of the model.

When observing the coefficients developed in 2013 shown in Table 4, the dimensions of social, environmental and financial eco-innovation significantly reflected all variables analyzed (p-value < 0.10), except Energy Consumption (EC) and Equal Pay for Men and Women (EP). However, it is noteworthy that although there was a positive effect of eco-innovation on the social and environmental dimensions, the financial construct was only significant for the social dimension.

This relationship between the social dimension (human capital) and a higher rate of leverage was also observed in the study by Scarpellini et al. (2017), which identified it as important for the process and development of eco-innovation. And according to the study by Batle et al. (2018) with Spanish tourism companies, social innovation can create additional and farther-reaching value to society, the environment and customers than traditional practices, but they assert that it is still necessary to have greater exploitation of environmental sustainability practices with social innovation. However, this result differs from the study carried out with Spanish companies by Cegarra-Navarro et al. (2016), who stated that there is a positive relationship between innovation and social responsibility, but did not find significance for the relationship between financial performance and social responsibility; i.e., they observed that social achievements do not guarantee better business performance.

In 2014 (developed countries), as well as in 2013, the environmental, social and financial dimensions also significantly reflected practically all the variables used in the literature. However, in 2014, the environmental dimension was the one that brought significance to the financial construct rather than the social one, as occurred in 2013; as well as Lee and Min (2015), who also found that eco-innovation contributes to better financial and environmental results. Thus, when comparing the two-year results, one can see that the three dimensions maintained their significance and presented no major differences in the period observed, showing that the companies did not greatly change their eco-innovative actions.

Considering the 2013 results for the emerging countries, only the social dimension significantly reflected the financial dimension, as also occurred in 2013 in companies located in developed countries. However, this result differs from Santos et al. (2017), who did not find significance of the social dimension on financial performance. Nonetheless, only the GHG emission and solid waste variables were significant, as well as in the social dimension, where there was little significance, with Workplace Accidents and Employee Turnover being representative. Finally, with regard to the financial dimension, the three variables were not significant, as was the case in developed countries (ROS did not generate significant results), unlike the results observed in Santos et al. (2017), where ROS was the dependent variable most highly influenced by the eco-innovation variables.

Also regarding Table 4, the 2014 result for emerging countries was similar to developed countries, in which the environmental dimension also significantly reflected the financial dimension. When analyzing the environmental dimension, only GHG emissions and energy consumption were significant, only the workplace accident and equal pay variables were significant in the social dimension and, lastly, only the income variable showed significance for 2014. This importance given to the GHG variable can be explained by the regulatory standards that the government imposes upon companies, while energy consumption is lowered in order to reduce costs within the companies (Horbach et al., 2012). This result is also close to that of Santos et al. (2017), who also observed that the environmental dimension brought significance to financial performance (particularly, the reduction of GHG emissions had a significant and positive impact on ROS), and also did not verify the significance of the social dimension on the financial performance of companies located in emerging countries.

The panel data regression results relating environmental and social dimensions to the ROS dependent variable are shown in Tables 5 and 6; the values generated by ROA and Revenue did not generate significance, therefore were not tabulated.

Table 5 – Panel Data Regression Results, environmental dimension with dependent variable: ROS

Variables	*Coefficients Developed countries*	*95% Confidence Interval*	*Coefficients Emerging Countries*	*95% Confidence Interval*	*Total Sample Coefficients*	*95% Confidence Interval*
const	7.367[a]	(7.068, 7.667)	7.262[a]	(6.696, 7.827)	5.8042[a]	(5.6425, 5.9658)
GHG	0.028[a]	(0.011, 0.046)	0.007	(-0.016, 0.030)	0.0374[a]	(0.0208, 0.0541)
WWE	0.007[b]	(0.001, 0.012)	0.098[a]	(0.057, 0.139)	0.0381[a]	(0.0242, 0.0520)
SW	0.020[a]	(0.011, 0.030)	-0.003	(-0.015, 0.008)	0.0138[a]	(0.0064, 0.0212)
MC	−0.011[a]	(-0.015, -0.007)	−0.097[a]	(-0.148, -0.046)	0.0283[a]	(0.0122, 0.0445)
EC	0.000	(-0.000, 0.000)	−0.029[c]	(-0.062, 0.003)	0.0217[b]	(0.0043, 0.03919)
WC	0.003	(-0.001, 0.006)	−0.087[a]	(-0.143, -0.032)	−0.0445[a]	(-0.0583, -0.0307)
R^2	0.1245		0.8732		0.2656	
Adjusted R^2	0.1090		0.8663		0.2559	
F Stat.	8.0364		125,141		27,424	
p-value (F)	4.00e-08		1.56e-46		6.01e-28	

Notes: [a] = Significance >99%; [b] = Significance > 95%; [c] = Significance > 90%
Source: Prepared by the author based on the research data

When analyzing the environmental variables with the dependent variable of Return on Sales (ROS), the values of R^2 and adjusted R^2 in the developed countries, emerging countries, and both (overall) showed close values, indicating a greater reliability in the model's coefficient of determination, the F statistic of which rejects the hypothesis of poor specification.

When observing the two economies jointly, the p-value showed significant values for all six environmental variables, which proves that there is a relationship between the six environmental variables and ROS. On the other hand, when observing developed countries, there was a significant increase in four of the six variables. If there is an increase in the capacity to reuse wastewater (WW) and solid waste (SW), and in consumption of materials (CM), there is also an increase in ROS; however, there is an increase in GHG emissions as well. Emerging countries also showed significance for the WW and CM variables, but unlike the developed countries, an increase in ROS was accompanied by a reduction in water consumption (WC) and energy consumption (EC). Thus, when analyzing the environmental variables with ROS, the emerging countries presented better results than developed countries.

This importance given to the environmental variables of GHG emissions, reduction of material consumption, energy consumption, and the increase of the amount of recycled waste was also

observed in the study conducted by Horbach et al. (2012), mainly due to government regulatory issues.

Based on Table 6, which shows the panel data regression results of the social variables with ROS, one can see that practically all the variables generated a high significance for the ROS in all three cases. Moreover, the p-value was less than 5% and the adjusted R^2 and R^2 values were very close. The only variable that did not present significance in any of the three cases was equal pay for men and women (EP).

Table 6 – Panel Data Regression results, social dimension with dependent variable: ROS

Variables	Coefficients Developed countries	95% Confidence Interval	Coefficients Emerging Countries	95% Confidence Interval	Total Sample Coefficients	95% Confidence Interval
const	5.279[a]	(4.818, 5.741)	5.561[a]	(5.162, 5.960)	6.1806[a]	(6.0505, 6.3107)
WA	0.025[a]	(0.014, 0.036)	-0.038[a]	(-0.046, -0.030)	0.0009	(-0.0042, 0.0060)
AS	−0.034[a]	(-0.048, -0.021)	-0.002	(-0.009, 0.004)	-0.0269[a]	(-0.0332, -0.0207)
TR	0.158[a]	(0.130, 0.186)	-0.037[a]	(-0.051, -0.022)	0.0142[a]	(0.0089, 0.0195)
SE	−0.033[b]	(-0.060, -0.007)	0.026[c]	(-0.001, 0.053)	-0.0653[a]	(-0.0736, -0.0570)
EP	0.047	(-0.040, 0.134)	-0.020	(-0.067, 0.027)	-0.0085	(-0.0314, 0.01445)
R^2	0.3448		0.6927		0.3807	
Adjusted R^2	0.3352		0.6787		0.3739	
F Stat.	35.7910		49.5837		56.0720	
p-value (F)	2.09e-29		1.22e-26		2.19e-45	

Notes: [a] = Significance >99%; [b] = Significance > 95%; [c] = Significance > 90%
Source: Prepared by the author based on the research data

The results of the developed countries suggest that, as ROS increases, absenteeism (AS) decreases, however the number of workplace accidents (WA) increases, as does employee turnover rate (TR), and investment in the community decreases (SE); i.e., the social results observed are not positive. With respect to emerging countries, the results were completely different, since an increase in ROS was accompanied by a decrease in the workplace accident frequency rate and employee turnover rate, and an increase in investment in the community.

4. Conclusion

Based on the descriptive analysis of the environmental dimension, the GHG emissions, energy consumption and water consumption variables were the most widely disclosed by both economies, as was the workplace accident frequency rate in the social dimension. Additionally, there was a greater concern with social variables in the emerging counties than in the developed counties.

Regarding the results of the developed countries generated by the structural equations model, practically all of the six environmental variables and five social variables brought significance to their respective dimensions. Another issue observed was that, in 2013, the financial construct was significant for the social dimension and in 2014 it was significant for the environmental dimension, thus reinforcing the assumption that eco-innovations bring economic impact.

Regarding the results for the emerging countries, only two out of six environmental variables and two out of five social variables were significant in 2013 and 2014, which shows the more advanced stage of eco-innovation in the developed countries. This can be explained by the fact that developed countries usually already have the necessary resources for eco-innovation, whereas emerging countries need more resources to innovate and implement changes for environmental and social improvements (Jo et al., 2015). However, as in the developed countries, only one of the dimensions was significant for the financial dimension in each year observed, which was the social dimension in 2013 and the environmental dimension in 2014.

When analyzing the results generated by the panel data regression, it was observed that the environmental variables brought a high degree of significance to ROS, and the companies established in emerging countries presented better results than those in developed countries. This is also the case with the social dimension, where virtually all the variables also generated significance for ROS in the two economies; however, much better results were observed in the emerging countries, since an

increase in ROS was accompanied by a decrease in the workplace accident frequency rate and employee turnover rate, and an increase in investments in the community.

Lastly, it is worth noting that the greatest difficulty of this study was to obtain the data in the sustainability reports. Since there is no standardization of data disclosure, it is necessary to perform calculations for some variables, as well as to search for past values in reports from previous years at some companies. Furthermore, the scope and systematization of the information is one of the main limiting factors in attaining results. Hence, the understanding of all the results discussed in this study is limited to the companies surveyed, so extrapolations to other sectors, countries and companies must respect this limitation.

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